

"Express Mail" mailing label number EV 314840706 US

Date of Deposit: November 21, 2003

Our Case No. 5658/986

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
APPLICATION FOR UNITED STATES LETTERS PATENT

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TITLE:

QUICK ADJUSTING PLIERS

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QUICK ADJUSTING PLIERS

[0001] This is a continuation-in-part patent application of U.S. Patent Application Serial No. 10/406,621, the entire contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] This invention relates generally to pliers devices, and more particularly, to pliers devices that can be quickly adjusted to several positions.

SUMMARY OF THE INVENTION

[0003] The present invention provides a device and method for clamping an object with quick adjusting pliers. In particular, a device is provided with a top jaw having a bottom handle, a slot, and a series of ridges located around the slot. A pin, which includes an engagement element, is provided for extending through the slot. In addition, a bottom jaw is provided with a top handle and another opening for receiving the pin. The top jaw and bottom jaw pivot about an axis of the pin, and the engagement element is moveable along the same axis from a first position wherein the engagement element engages at least one of the series of ridges to a second position wherein the engagement element does not engage any of the series of ridges.

[0004] In one embodiment of the invention, the ridges are straight.

[0005] In another embodiment of the invention, the ridges are curved.

[0006] These and other features of the invention will become apparent upon review of the following detailed description of the presently preferred embodiments of the invention, taken into conjunction with the appended figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] **FIG. 1** is an exploded view of a quick adjusting pliers device according to a first embodiment of the present invention.

[0008] **FIG. 2** is a top view of the tongue element of the quick adjusting pliers device of **FIG. 1**.

- [0009] FIG. 3 is a perspective top view of the tongue element of the quick adjusting pliers device of FIG. 1.
- [0010] FIG. 4 is a perspective bottom view of the tongue element of the quick adjusting pliers device of FIG. 1.
- [0011] FIG. 5 is a left side view of the tongue element of the quick adjusting pliers device of FIG. 1.
- [0012] FIG. 6 is a perspective top view of the spring of the tongue element of the quick adjusting pliers device of FIG. 1.
- [0013] FIG. 7 is a left side view of the quick adjusting pliers device of FIG. 1, with the device in the closed position.
- [0014] FIG. 8 is a front view of the quick adjusting pliers device of FIG. 1, with the device in an intermediate position of adjustment.
- [0015] FIG. 9 is a back view of the quick adjusting pliers device of FIG. 1, with the device in an intermediate position of adjustment.
- [0016] FIG. 10 is a front perspective view of a quick adjusting pliers device according to a first embodiment of the present invention, with the device in the closed position and with elastomeric handles.
- [0017] FIG. 11 is a back perspective view of the quick adjusting pliers device of FIG. 10, with the device in the closed position.
- [0018] FIG. 12 is an exploded view of a quick adjusting pliers device according to a second embodiment of the present invention, with engagement of straight ridges above the pivot.
- [0019] FIG. 13 is an enlarged perspective view of the quick adjusting pliers device of FIG. 12, with the device in the open position.
- [0020] FIG. 14 is an exploded view of a quick adjusting pliers device according to a third embodiment of the present invention, with engagement of curved ridges below the pivot.
- [0021] FIG. 15 is an enlarged perspective view of the quick adjusting pliers device of FIG. 14, with the device in an intermediate position.

[0022] **FIG. 16** is an enlarged perspective view of a quick adjusting pliers device according to a fourth embodiment of the present invention, with engagement of curved ridges above the pivot.

[0023] **FIG. 17** is an exploded view of a quick adjusting pliers device according to a fifth embodiment of the present invention, with engagement of straight ridges adjacent to the pivot.

[0024] **FIG. 18** is a front view of the quick adjusting pliers device of **FIG. 17**, with the device in the closed position.

[0025] **FIG. 19** is a back view of the quick adjusting pliers device of **FIG. 17**, with the device in the closed position.

[0026] **FIG. 20** is an exploded perspective bottom view of the quick adjusting pliers device of **FIG. 17**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0027] Referring to **FIG. 1**, an exploded view of an embodiment in accordance with the quick adjusting pliers device of the present invention is shown. A top jaw **20** is integrally attached to a bottom handle **26a**. The top jaw **20** has a slot **22** formed therein and has a series of ridges **24** formed on both sides of the slot **22** and above the bottom handle **26a**. A bottom jaw **28** is integrally attached to a top handle **26b** and has an opening **27** for receiving a pin **29**. Pin **29** extends through an opening of a spring **34** (see **FIG. 6**), opening **40** of tongue element **32**, opening **27** of bottom jaw **28**, and slot **22**. With head **30**, pin **29** pivotally connects the top jaw **20**, bottom jaw **28**, tongue element **32** and spring **34**. Tongue element **32** is biased by spring **34**.

[0028] **FIGS. 2-5** illustrate the structure and rocker shape of tongue element **32** from various views. Tongue element **32** includes an extending portion **35** that extends through slot **22**. The extending portion **35** keeps the tongue element aligned with the upper jaw **20**. One or more teeth **38** are provided on tongue element **32** for engaging one or more of the series of ridges **24**. Portion **35** extends in between and beyond teeth **38** underneath the top surface of tongue element **32**. In order to promote translation of the tongue element **32** and bottom jaw **28**

towards the top jaw 20, ridges 24 are angled towards top jaw 20 while teeth 38 are angled away from top jaw 20. Tongue element 32 and bottom jaw 28 are thus able to freely translate towards the top jaw 20 while being prevented by the ridges 24 from translating away from the top jaw 20. Accordingly, tongue element 32 is moveable relative to the ridges 24 to allow for engagement or disengagement with said ridges 24.

[0029] FIGS. 7- 9 further illustrate the quick adjusting pliers device of FIG. 1. Ridges 24 are formed on both sides of the lower end of slot 22. As shown in FIG. 8, ridges 24 are straight in shape. However, curved ridges can also be used. Top jaw 20 and bottom jaw 28 pivot about a first axis that extends though a longitudinal axis of pin 29 and head 30. Tongue element 32 and bottom jaw 28 are moveable since tongue element 32 can be engaged and disengaged by ridges 24, as described above. With straight ridges, as shown, one or more teeth 38 can be used. With curved ridges, only one tooth 38 can be used.

[0030] As shown in FIG. 8, tongue element 32 includes a button 33. When pressed, button 33 pulls the teeth 38 of tongue element 32 out of the ridges 24. Thus, tongue element 32 pivots about a second axis that is perpendicular to the first axis so that bottom jaw 28 can move away from top jaw 20 and release an object. This allows the bottom jaw 28 to freely move towards or away from top jaw 20 to provide either a smaller or larger opening between the jaws of the device. Note that pressing extended portion 35 of the tongue element towards slot 22 pushes tongue element 32 out of the ridges 24 as well. Thus, pressing extended portion 35 also allows bottom jaw 28 to be moved towards or away from top jaw 20 to provide a smaller or larger opening between the jaws of the device.

[0031] In order for the jaws of the device to clamp an object, the teeth 38 of tongue element 32 engage a ridge 24 that corresponds to the size of the object being clamped. Bottom jaw 28 then pivots about pin 29, which is translationally fixed due to the engagement between the teeth of the tongue element and the correct ridge. When there is no object to be gripped and top jaw 20 and bottom jaw 28 contact one another, the tool can stay in this position, which allows for easy storage.

[0032] **FIGS. 10-11** illustrate the first embodiment with the top jaw **20** and bottom jaw **28** of the device in the closed position. In addition, bottom handle **26a** and top handle **26b** have an elastomeric material fitted around their exteriors, making the handles slightly thicker.

[0033] **FIGS. 12-13** illustrate a second embodiment of the present invention. Ridges **124** are straight and located at the upper end of slot **122**. However, curved ridges can also be used. Pin **129** extends through openings **127** and **140**. Handles **126a** and **126b**, slot **122**, pin **129** and head **130** are similar to, and function the same as corresponding items **26a**, **26b**, **22**, **29** and **30**, as described in the embodiment of **FIGS. 1-9**. Tongue element **132** has a somewhat different shape than tongue element **32** of the previous embodiment. Tongue element **132** has an extending portion **135** and teeth **138**. With straight ridges, as shown, one or more teeth **38** can be used. With curved ridges, only one tooth **38** can be used. Tongue element **132** utilizes a raised surface **133** instead of a button to pull teeth **138** out of ridges **124** in a lever-like fashion. Spring **134** has a U-shape.

[0034] **FIGS. 14-15** illustrate a third embodiment of the present invention. Ridges **224** are curved and located at the lower end of slot **222**. However, straight ridges can also be used. Pin **229** extends through openings **227** and **240**. Handles **226a** and **226b**, slot **222**, pin **229**, and head **230** are similar to, and function the same as corresponding items **26a**, **26b**, **22**, **29** and **30**, as described in the embodiment of **FIGS. 1-9**. Tongue element **232** has an extending portion **235** and tooth **238**. With curved ridges, as shown, only one tooth **238** can be used. With straight ridges, one or more teeth **238** can be used. Tongue element **232** utilizes a raised surface **233** instead of a button to pull tooth **238** out of ridges **224** in a lever-like fashion. Spring **234** has a coiled shape and operates in a manner similar to spring **34** of **FIGS. 1-9**.

[0035] **FIG. 16** illustrates a fourth embodiment of the present invention. Ridges **324** are curved and located at the upper end of slot **322**. However, straight ridges can also be used. Handles **326a** and **326b**, slot **322**, pin **329**, and head **330** are similar to, and function the same as corresponding items **26a**, **26b**, **22**, **29** and **30**, as described in the embodiment of **FIGS. 1-9**. Tongue element **332** has an

extending portion (not shown) and tooth 338. With curved ridges, as shown, only one tooth 38 can be used. With straight ridges, one or more teeth 38 can be used. Tongue element 332 utilizes a raised surface 333 instead of a button to pull tooth 338 out of ridges 324 in a lever-like fashion. A spring (not shown) used in any of the previous embodiments may be used in this fifth embodiment.

[0036] FIGS. 17-20 illustrate a fifth embodiment of the present invention. A top jaw 420 is integrally attached to a bottom handle 426a. The top jaw 420 has a slot 422 formed therein and has a series of straight ridges 424 formed around the slot 422 on the back side of top jaw 420. Curved ridges can also be used.

[0037] A bottom jaw 428 is integrally attached to a top handle 426b and has an opening 427 for receiving pin 429. Pin 429 pivotally connects top jaw 420, bottom jaw 428, a button 433 and a spring 434. Handles 426a and 426b have an electrometric material shaped around their exteriors, making the handles slightly thicker and easier to grip.

[0038] As shown in FIGS. 17 and 20, pin 429 includes a cylindrical bottom 430, an engagement element 431 and a head 432. Pin 429 is inserted through slot 422 and opening 427. Engagement element 431 is more oblong in shape than bottom 430 in order to fit within slot 422.

[0039] A bracket 450 is attached to the bottom jaw 428 and top handle 426b with rivets 455 so that engagement element 431 and head 432 are contained within a receptacle 453 of the bracket. Button 433 is connected to the free end of pin bottom 430. Spring 434 is placed around head 432 between engagement element 431 and receptacle 453 so as to bias engagement element 431 downward to contact ridges 424.

[0040] Engagement element 431 has teeth 438 that engage at least one of the series of ridges 424. Placing the teeth adjacent to the pivot in this embodiment provides a more positive and reliable engagement with ridges 424. With straight ridges, as shown, one or more teeth can be used. With curved ridges, only one tooth can be used.

[0041] In order for the jaws of the device to clamp an object, teeth 438 engage at least one of the series of ridges 424 corresponding to the size of the object being

clamped. Top jaw **420** and bottom jaw **428** pivot about a first axis that extends through a longitudinal axis of pin **429**, which is translationally fixed due to the engagement between the teeth and the correct ridges. When pressed, button **433** raises teeth **438** out of ridges **424**. Thus, the engagement element **431** is moveable along the first axis from a first position wherein the engagement element engages at least one of the series of ridges to a second position wherein the engagement element does not engage any of the series of ridges. Engagement element **431** can then translate along a second axis that is perpendicular to the first axis so that bottom jaw **428** can move away from top jaw **420** to release an object.

[0042] In order to promote translation of pin **429** and bottom jaw **428** towards top jaw **420**, ridges **424** are angled towards top jaw **420** while teeth **438** are angled away from top jaw **420**. Pin **429** and bottom jaw **428** are thus able to freely translate towards the top jaw **420** while being prevented by the ridges **424** from translating away from the top jaw **420** unless button **433** is pressed. Accordingly, engagement element **431** is moveable relative to the ridges **424** to allow for engagement or disengagement with said ridges **424**.

[0043] Bottom jaw **428** includes a step **460** that prevents top jaw **420** from being opened too wide. The attachment of bracket **450** to bottom jaw **428** and top handle **426b** allows for double shear, which minimizes the stress on the pin at the pivot point and effectively transfers the load to the bottom jaw.

[0044] It is intended that the foregoing detailed description be regarded as illustrative rather than limiting and that it be understood that it is the following claims, including all equivalents, which are intended to define the scope of this invention.